

**SUR-REBUTTAL TESTIMONY OF  
DEREK P. STENCLIK  
ON BEHALF OF  
SIERRA CLUB  
DOCKET NO. 2019-226-E**

1   **Q:    Please state your name, position, and business address for the record.**

2   A:    My name is Derek Stenclik and I am the President of Telos Energy, Inc. My business  
3       address is 475 Broadway, Unit 6, Saratoga Springs, NY 12866.

4   **Q:    Have you previously submitted direct testimony in this proceeding?**

5   A:    Yes, I have.

6   **Q:    On whose behalf are you testifying in this proceeding?**

7   A:    I am submitting this testimony on behalf of the Sierra Club.

8   **Q:    What is the purpose of your sur-rebuttal testimony?**

9   A:    The purpose of my sur-rebuttal testimony is to respond to the rebuttal testimony of Eric  
10       Bell, James Neely, and Dr. Joseph Lynch (“DESC Witnesses”) filed on behalf of  
11       Dominion Energy South Carolina. In this testimony I also provide an update to the  
12       modeling results presented in my direct testimony to account for many of the changes  
13       implemented by DESC in their Restated and Supplemented IRP.

14   **Q:    Please identify the documents and filings on which you base your opinions**  
15       **regarding DESC’s 2020 IRP.**

16   A:    I reviewed the rebuttal testimony of DESC witnesses Eric Bell, Therese Griffin, Dr.  
17       Joseph Lynch, and James Neely. I also reviewed the Restated and Supplemented Version  
18       of Chapter II.B.5 of the Dominion Energy South Carolina, Inc. 2020 IRP (2020 IRP  
19       Supplement) and the associated workpapers, namely the Revenue Requirements

1 spreadsheets. In addition, I reviewed the J. Kennedy and Associates, Inc. Report titled  
2 “Review of Dominion Energy South Carolina, Inc. 2020 Integrated Resource Plan” (ORS  
3 Report) attached as Exhibit AMS-1 to the Direct Testimony of Anthony Sandonato.

4 **Q: How is your testimony organized?**

5 A: My sur-rebuttal testimony is organized into four sections, outlined below:

- 6 1. Review of DESC 2020 IRP Supplement modeling updates
- 7 2. Updates to independent modeling of alternative portfolios
- 8 3. Responses to rebuttal comments made by DESC
- 9 4. Recommendations for the Commission

10 **REVIEW OF DESC 2020 IRP SUPPLEMENT MODELING UPDATES**

11 **Q: Did you review DESC’s IRP Supplement and which changes did you focus on?**

12 A: Yes, I reviewed DESC’s IRP Supplement and associated workpapers. First, I would like  
13 to recognize DESC’s willingness to receive recommendations and feedback via the IRP  
14 testimony process and quickly incorporate adjustments into their modeling and IRP  
15 Supplement. This is an important aspect of the stakeholder process, and DESC’s  
16 willingness to thoroughly review intervenor testimony and make some of the updates that  
17 were suggested is appreciated.

18 DESC made several changes to their analysis, largely related to the revenue requirements  
19 spreadsheet modeling. As in my direct testimony, I focused my attention on changes to  
20 the capital cost assumptions for new resources, ongoing capital cost for existing fossil  
21 generation, costs of Effluent Limitation Guidelines (ELG) upgrades at Williams and  
22 Wateree, fixed operations and maintenance costs, and escalation rates for battery energy  
23 storage and solar PV.

1 **Q: In Mr. Neely's testimony he addresses changes to DESC's battery capital cost and**  
2 **fixed operations and maintenance assumptions. Do you agree with these changes?**

3 A: I appreciate Mr. Neely's and DESC's recognition that their original battery energy  
4 storage capital cost assumptions used in the 2020 IRP were too high and for their  
5 willingness to update the analysis with lower, more reasonable, price assumptions.<sup>1</sup>  
6 While \$1,349/kW (\$337/kWh) is still higher than other prices I have seen in recent  
7 consulting engagements with project developers, it is much more reasonable than  
8 DESC's original assumption. As a result, I have updated my modeling assumptions to use  
9 this value as well to be consistent with DESC modeling.

10 However, the continuing rapid decline in battery energy storage costs demonstrates the  
11 importance of using a base case forecast and a low capital cost estimate. As I stated in my  
12 direct testimony, industry sources like EIA Annual Energy Outlook (AEO) and NREL  
13 Annual Technology Baseline (ATB) were historically conservative in their cost  
14 projections for wind and solar technologies – these costs dropped significantly faster than  
15 projected. The same could be true for battery storage technology and DESC's modeling  
16 should include scenarios and sensitivities that proactively plan for that potential future  
17 with battery storage.

18 I also agree with DESC's update to use two different escalation rates for battery storage  
19 and solar PV, one from 2020 to 2030, and another for 2031 and onwards.<sup>2</sup> If correctly  
20 implemented in their modeling, this approach will capture the learning curve for new  
21 technologies, where early cost improvements occurred relatively quickly, but slow down

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<sup>1</sup> Rebuttal Testimony of James W. Neely, Page 11.

<sup>2</sup> Rebuttal Testimony of James W. Neely, Page 7.

1 as the technology matures. As a result, I also incorporated a two-tiered cost escalation  
2 assumption in my modeling updates.

3 Finally, I also agree with ORS' recommendation, and DESC's 2020 IRP Supplement, to  
4 include fixed operations and maintenance (FO&M) costs for battery storage and solar PV  
5 technologies. The proposed values from EIA<sup>3</sup> seem reasonable relative to other sources I  
6 have reviewed. These values were also incorporated into my modeling updates to remain  
7 consistent with DESC to the extent reasonable.

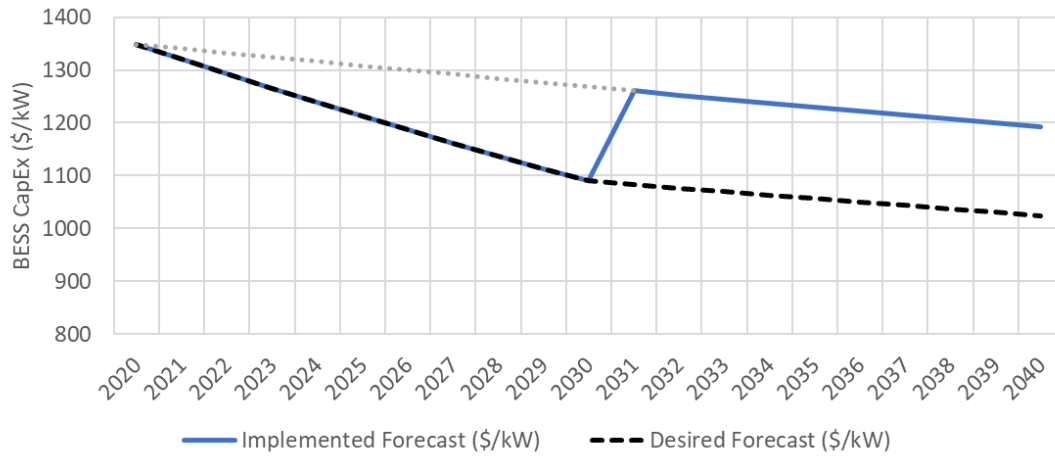
8 **Q: Were the proposed changes to the battery capital cost assumptions implemented**  
9 **correctly in DESC's revenue requirements model?**

10 A: No. While in the answer above I state that DESC's approach to use a two-tiered  
11 escalation rate is reasonable, its implementation in the revenue requirements model is  
12 incorrect and once again overstates battery costs for future years. DESC proposed to use  
13 two escalation factors for battery storage and solar PV capital costs, one for 2020-2030  
14 and one for 2031 and onwards. However, in DESC's revenue requirements modeling, the  
15 de-escalation of the 2031 and later capital costs were based off the capital cost  
16 assumption in the 2020 base year, rather than starting from 2030 values which already  
17 de-escalated at a faster rate.<sup>4</sup> As a result, the capital costs assumed in 2031 and onward  
18 step up to a level significantly higher than the 2030 values and overstates the capital costs  
19 in the later years of the forecast. The same is true for solar PV. This error is highlighted  
20 in Figures 1 and 2 below, which recreate DESC's implemented price forecast in the  
21 revenue requirements model (blue solid line) and compares it to the desired price forecast  
22 (black dashed line). This change should be updated immediately by DESC.

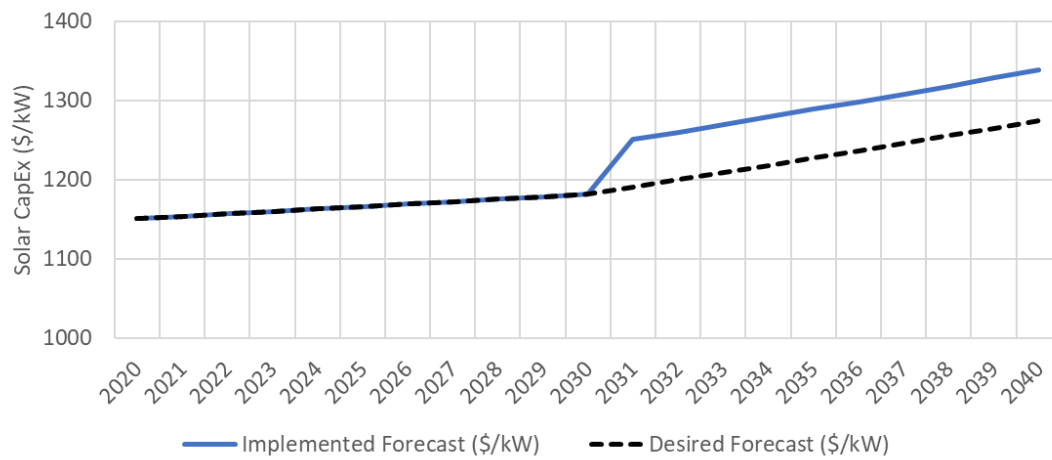
<sup>3</sup> Rebuttal Testimony of James W. Neely, Page 11.

<sup>4</sup> Rebuttal Testimony Workpapers, "Revenue Requirements – CONFIDENTIAL."

**Figure 1: DESC Battery Price Assumption, Implemented vs. Desired**



**Figure 2: DESC Solar PV Price Assumption, Implemented vs. Desired**



1 **Q: The ORS Report prepared by J. Kennedy and Associates, Inc. and the DESC**  
2 **rebuttal testimony of Mr. Neely differ in their recommendations for the life of**  
3 **battery storage projects and future replacement. Can you summarize these positions**  
4 **and provide your recommendation?**

5 A: The ORS Report recommended that DESC should add “replacement capital costs or  
6 refurbishment costs for BESS resources at the end of the resource’s assumed ten (10)  
7 year operating life.”<sup>5</sup> In response to this recommendation, James Neely’s rebuttal  
8 testimony states that “DESC investigated this question and determined that battery  
9 storage can last up to 30 years but doing so requires a 20% cell augmentation every seven  
10 years. The fixed O&M cost that was added for battery storage [...] includes the cost for a  
11 3% cell augmentation every year. This allows the battery’s capacity to be maintained so  
12 that replacement is not required during the model period.”<sup>6</sup>

13 I believe that DESC’s revised approach, as described in Mr. Neely’s rebuttal testimony,  
14 better captures the reality of long-term battery maintenance and degradation management  
15 than the proposal recommended by the ORS report. Modern battery energy storage  
16 systems are designed, and are often warrantied, to last more than 20-years with limited  
17 augmentation required. In addition, when augmentation is required, it is the battery cells  
18 that require replacement, not the entire battery energy storage system. ORS’s  
19 recommendation to retire and replace the battery energy storage systems after ten years  
20 does not reflect the current state of technology and would lead to significant additions of  
21 capital cost that would not be required.

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<sup>5</sup> Direct Testimony of Anthony M. Sandato, Exhibit AMS-1, Page 76.

<sup>6</sup> Rebuttal Testimony of James W. Neely, Page 17.

1 **Q: In Mr. Bell's rebuttal testimony he provides an explanation for the assumed ICT**  
2 **capital costs used by DESC which are much lower than other industry estimates. Do**  
3 **you agree with this explanation?**

4 A: Mr. Bell's rebuttal testimony states that the ICT capital costs are derived from actual,  
5 quoted prices available to DESC, and that "they represented prices that the vendor has  
6 committed to provide Dominion Energy, Inc. and its subsidiaries under a volume  
7 discount for ICT units of this type."<sup>7</sup>

8 Mr. Bell did not provide specifics of the vendor quote or volume discount. However,  
9 even if we assume that these comments are accurate, they are irrelevant to DESC's IRP  
10 planning. If a volume discount is currently available to DESC, using it for the purposes of  
11 long-term planning is inappropriate. The first ICT units added by DESC in RP2 are in  
12 2035 and it is doubtful that volume discounts would apply if only one ICT units is  
13 purchased over a 16-year period.

14 In addition, even if the volume discount is available due to potential purchases by  
15 Dominion Energy, Inc. in other jurisdictions, these also are not certain. Recent legislation  
16 in the Virginia Clean Economy Act (VA Code 56-585.1A 5 c) has made proposed ICT  
17 projects uncertain, stating:

18 *"Notwithstanding any other provision of law, unless the Commission finds in its*  
19 *discretion and after consideration of all in-state and regional transmission entity*  
20 *resources that there is a threat to the reliability or security of electric service to*  
21 *the utility's customers, the Commission shall not approve construction of any new*  
22 *utility-owned generating facilities that emit carbon dioxide as a by-product of*

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<sup>7</sup> Rebuttal Testimony of Eric H. Bell, Page 7.

1           *combusting fuel to generate electricity unless the utility has already met the*  
2           *energy savings goals identified in § 56-596.2 and the Commission finds that*  
3           *supply-side resources are more cost-effective than demand-side or energy storage*  
4           *resources.”*<sup>8</sup>

5           This new legislation in Virginia, and DESC’s own analysis, which shows gas peakers are  
6           not required until the mid-2030s, makes the assumption of a volume discount highly  
7           questionable.

8           In addition, Mr. Bell’s testimony did not provide details of the vendor quote and did not  
9           specify if the capital cost assumptions reflected only the gas turbine equipment, or if it  
10          represented turn-key, overnight capital cost of an operating ICT power plant. Many of the  
11          gas turbine vendors are equipment manufacturers and quotes may or may not include the  
12          Engineering, Procurement, and Construction (EPC), contracting costs to develop and  
13          construct a full plant.

14          Even if Dominion Energy, Inc. received a vendor quote significantly lower than capital  
15          costs seen in other industry reports due to the volume discount, it is unlikely that these  
16          prices would be guaranteed 15 years into the future and if the number of units purchased  
17          was much lower than expected. As a result, I recommend DESC update its analysis to  
18          industry accepted ICT capital cost assumptions outlined in my direct testimony.

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<sup>8</sup> Virginia Senate Bill No. 851, March 5, 2020, <https://lis.virginia.gov/cgi-bin/legp604.exe?201+ful+SB851H2>



1        **UPDATES TO INDPENDENT MODELING OF ALTERNATIVE PORTFOLIOS**

2        **Q:     Given the modeling updates made by DESC in the 2020 IRP Supplement, did you**  
3                **update the modeling you conducted for the alternative portfolios evaluated by**  
4                **Sierra Club?**

5        A:     Yes, the modeling conducted for my direct testimony was done in a way to minimize the  
6                number of changes to DESC's inputs and assumptions and instead focused only on a  
7                selection of key assumptions that were most important to the modeling results. This was  
8                done to simplify the comparison to DESC's own analysis.

9                Given the significant number of changes and updates DESC made in the IRP Supplement  
10                based on ORS and other intervenor recommendations, I incorporated the changes  
11                associated with the assumptions in the Revenue Requirements model and other post-  
12                processing updates. No changes were made to the proposed portfolios or the production  
13                cost simulations. Unless otherwise noted below, all of the changes to the Revenue  
14                Requirements spreadsheet model were incorporated.

15                A list of the modeling updates included in both DESC's 2020 IRP Supplement and my  
16                modeling presented in this sur-rebuttal testimony are provided in the table below, which  
17                was adapted from Mr. Bell's rebuttal testimony.<sup>9</sup> All changes listed were also adopted by  
18                my modeling updates, unless identified with a strikethrough and discussed in the  
19                following paragraphs explaining why the changes were not made.

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<sup>9</sup> Rebuttal Testimony of Eric H. Bell, Page 5.

**Table 1: Numerical Changes Incorporated in the IRP Supplement**

ORS Report Item Number	Short Description of ORS Immediate Changes
13	Revise the Escalation and De-Escalation Factors for Solar and Battery Costs
14	Review and Revise Capital Costs for Internal Combustion Turbines ("ICTs")
15	Review and Revise Fixed O&M for Solar and Battery Assets
<del>16a</del>	<del>Review and Revise Variable O&amp;M for Combined Cycle and ICTs</del>
<del>16b</del>	<del>Review and Revise Fixed O&amp;M for Combined Cycle and ICTs</del>
21	Escalate the Cost of Peaking Purchases (off-system sales and purchases)
23a	Correct Certain Identified Spread Sheet Errors
23b	Include AFUDC Costs in Fossil Unit Capital Costs
23c	Escalate Capital Cost of Coal Unit Effluent Limitation Guidelines ("ELG") Assets
23d	Add Ongoing Fossil Plant Capital Costs
23e	Revise End of Life/Life Extension Costs for Battery Storage ("BESS") Assets
23f	Include Investment Tax Credits in the Capital Cost of Solar and Battery Storage
23g	Review Retirement/Dismantlement Costs for Fossil Units
23h	Correct ELG Depreciation Assumptions
23i	Add Gas Firm Transportation Costs for Large ICT
<del>23j</del>	<del>Include Costs of a ICT to Be Added in 2040 that Was Omitted in RP8</del>
23k	Revise the Cost Escalation Assumption for Last 10 Years of the Studies

**Q: Which changes made by DESC were specifically not incorporated into your modeling updates?**

A: There are some modeling updates that I did not include and others that were included but implemented somewhat differently than DESC. For example, I did not use the same battery storage and solar PV escalation methodology that DESC implemented. As explained earlier, this appears to have been implemented incorrectly by DESC and I included the two-tiered escalation rate that DESC described in rebuttal testimony, but not the changes reflected in their Revenue Requirements modeling.

I also did not include the investment tax credits for battery storage additions made to replace Williams and Wateree coal plants. Because these additions were made to replace

1 coal capacity, the charging constraints imposed by the ITC for the first 5-years of the  
2 battery operations could limit their ability to operate when necessary. This is specifically  
3 the case for cold winter mornings where peak load occurs before sunrise. To account for  
4 this possibility, I assumed that the batteries were not eligible for ITC benefits and thus  
5 could charge from the grid when necessary. However, state of charge management and  
6 limited grid charging could be done to still allow for hybrid solar+storage configurations  
7 for this use case. As a result, this assumption is conservative.

8 Finally, because my scenarios did not include additional ICT or CC capacity there was no  
9 need to update the FO&M and VO&M for those candidate technologies.

10 **Q: How did these updates change your results?**

11 A: As Mr. Bell's rebuttal testimony explains,<sup>10</sup> the IRP modeling updates made by DESC,  
12 which I have also incorporated, increase the total cost of each of the evaluated resource  
13 portfolios. This is largely due to the inclusion of more costs, such as the ongoing capital  
14 cost of fossil generation and updated fixed operations and maintenance costs. However,  
15 for the purposes of the 2020 IRP, I agree with Mr. Bell that the *relative* cost changes  
16 between the different portfolios are more important than the absolute cost. In that respect,  
17 the updated changes lead to rather small changes to the *relative* cost positions of the  
18 different portfolios evaluated.

19 The new results, provided in the table below, yield a similar conclusion to my direct  
20 testimony – the retirement of Wateree and Williams, replacement with solar and storage  
21 resources, and lower assumed load growth, yield cost savings for DESC ratepayers  
22 relative to DESC's preferred plan RP2. Unlike my direct testimony, the earlier retirement

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<sup>10</sup> Rebuttal Testimony of Eric H. Bell, Page 9.

of Wateree and Williams in 2026 (as opposed to 2028) is now slightly lower cost than the 2028 scenario. This is largely due to a two-year avoidance of ongoing capital cost for coal generators that was added in DESC's most recent analysis.

**Table 2: Numerical Changes Incorporated in the IRP Supplement**

Scenario	Description	NPV	Rank	Delta to Scenario 1
1	Business-as-Usual, DESC RP2, No Coal Retirements	1,270,911	4	-
	Scenario 1 using DESC's ICT Capital Cost Assumption	1,266,143	3	-0.4%
2	Coal Retirement in 2026, PV & Battery Replacement	1,255,504	1	-1.2%
3	Coal Retirement in 2028, PV & Battery Replacement	1,256,034	2	-1.2%
4	Coal Retirement in 2026, 2x PV & 2x Battery Replacement	1,338,276	6	5.3%
5	Coal Retirement in 2026, 2x PV & 1x Battery Replacement	1,282,420	5	0.9%

In addition, because the ICT capital cost assumption was updated in Scenario 1 to reflect industry standard assumptions, I also include results from Scenario 1 assuming DESC's questionably low ICT capital cost assumption. Even if DESC's capital cost assumption is used instead of industry normal prices, the coal retirement scenario which includes no gas additions remains lower cost.

**Q: Of the many modeling updates recently included by DESC, which ones favor the early retirement of Williams and Wateree and replacement with renewables and storage additions?**

**A:** Of the many modeling updates recently included by DESC, nearly all of them favor the early retirement of Williams and Wateree and the replacement with renewables and battery energy storage. For example, the battery capital cost assumption was decreased by 29.4%, making replacement technology more economic.

1 On the other hand, the continued operation of Williams and Wateree was made  
2 significantly more expensive. Inclusion of ongoing capital costs for Williams and  
3 Wateree adds ~\$50M/year to scenarios which include continued operation of the coal  
4 plants. In addition, the revision to include escalation of Wateree and Williams ELG  
5 retrofit costs to nominal dollars increased the retrofit cost for the two units from \$228.5  
6 million to \$255.2 million.

7 DESC's assumed replacement capacity for the coal generators was also updated to be  
8 more expensive. CCGT gas capital costs were increased by 5.7%, as did the  
9 corresponding O&M expenses. The inclusion of firm gas supply costs for the new ICT  
10 replacement capacity also increased costs by about \$2.0M/year. These updates make the  
11 use of PV and battery replacements relatively more economic than gas additions.

12 The only change that appears to make renewable additions slightly less economic than  
13 the original 2020 IRP filing is the inclusion of fixed O&M costs for solar and battery  
14 technologies.

15 **Q: Why does your coal retirements portfolio remain the least-cost option, but DESC's**  
16 **coal retirement scenario (RP8) become less economic relative to their least cost**  
17 **plan?**

18 A: Even with all of the changes listed above, in DESC's 2020 IRP Supplement, RP2 remains  
19 the least cost plan, while RP8 becomes less economic. In contrast, the coal retirement and  
20 replacement portfolios proposed in my Direct Testimony on behalf of Sierra Club (Sierra  
21 Club portfolios) remain lower cost than DESC's preferred plan. There are several reasons  
22 for this. First, I corrected the error in DESC's implementation of the battery and PV

1 escalation costs, which I discussed previously. This reduced the capital costs assumption  
2 of PV and batteries installed after 2030 making those additions more economic.

3 In addition, DESC increased the capital cost assumption for new CCGT replacement used  
4 in their RP8 portfolio. DESC also increased the assumption for firm gas supply costs  
5 associated with the new ICT replacement capacity. Because Sierra Club's portfolios do  
6 not include gas replacements (either CCGT or ICT), these costs are not included in the  
7 clean energy portfolios.

8 Because it is unrealistic to receive a volume discount 15-years into the future, I did not  
9 include the ICT volume discount price assumed by DESC. As a result, because Sierra  
10 Club's proposed portfolios do not include ICT replacements, these costs are not incurred  
11 in the portfolio. These increases in the costs of gas replacement are the primary reason  
12 DESC's RP8 coal retirement scenario becomes less economic relative to the other  
13 portfolios; it is not due to the costs of renewable replacements.

14 Finally, the Sierra Club portfolios assume a lower, more reasonable, winter peak load  
15 assumption. This change, which I discuss in my direct testimony, requires less capacity  
16 additions to replace the retired coal generators, making the portfolio lower cost. This  
17 change does however also reduce the cost of the DESC RP2 Base Case.

18 **Q: What do these results illustrate regarding the DESC 2020 IRP Supplement**  
19 **methodologies?**

20 **A:** These results indicate that alternative portfolios that were not identified by DESC may  
21 actually be lower cost than the eight evaluated and presented in the 2020 IRP and IRP  
22 Supplement. This highlights the importance of using optimal capacity expansion planning

1 tools to select least cost plans rather than relying on judgement, which may include  
 2 unintentional biases about least cost plans.

3 These results also indicate that DESC's results are sensitive to changes in assumptions  
 4 related to the load forecast and capital costs. Future IRPs should use a much larger range  
 5 of expected inputs to ensure that least cost plans are properly identified.

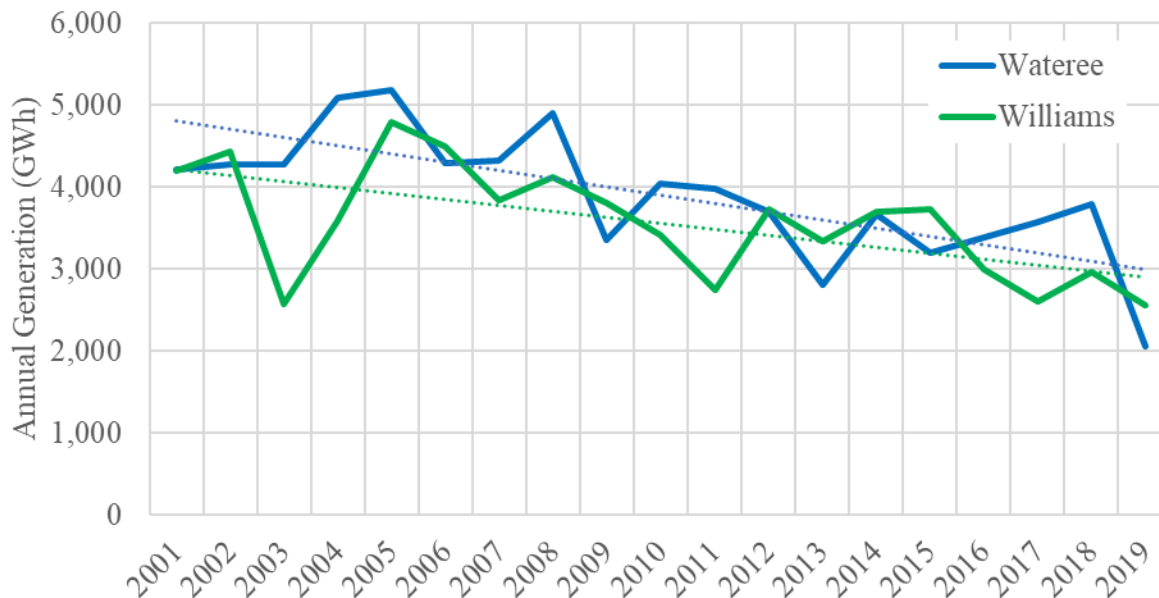
6 **RESPONSES TO REBUTTAL COMMENTS MADE BY DESC**

7 **Q: In Mr. Neely's rebuttal testimony, he states that your alternative resource plans**  
 8 **"assume that DESC can retire 1,294 MW of coal capacity and replace it with only**  
 9 **460 MW or 920 MW of battery storage and associated solar capacity." Can you**  
 10 **explain this?**

11 **A:** Mr. Neely suggests that it would be unreliable to retire 1,294 MW of coal capacity and  
 12 replace it with only 460 MW or 920 MW of battery storage and solar capacity. As stated  
 13 in my direct testimony, additions were made to ensure a reliable system, using the reserve  
 14 margin target as a proxy for reliability, and there was no intent or need for battery storage  
 15 and solar to be a one-for-one replacement for the coal generators. The coal plants are  
 16 currently running approximately 20% less than historical levels due to economics and  
 17 low gas prices (Figure 3) and in 2019 ran at capacity factors of only 34% (Wateree) and  
 18 48% (Williams).<sup>11</sup> Year-to-date 2020 generation was reduced even further due to the  
 19 outage at Wateree and low load due to COVID. Replacing underutilized coal generation  
 20 with a baseload resource is neither economic nor necessary.

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<sup>11</sup> Based on an average of 2018 and 2019 annual generation relative to the previous ten years. Based on data from U.S. Energy Information Administration, Form EIA-923, <https://www.eia.gov/electricity/data/eia923/>

**Figure 3: Williams & Wateree Coal Plant Utilization, 2001 - 2019**

In addition, the DESC system is currently significantly overbuilt – with 2020 winter reserve margins of 25.5% in DESC RP2 portfolio. If adjustments are made to the peak winter peak load forecast, as suggested in my direct testimony, this overbuild is amplified, requiring less capacity to replace the retired coal plants.

It should be noted that the solar and storage additions should not be expected to exactly replicate the characteristics of the coal plants they are replacing – nor do we want them to. Rather than providing slow, inflexible, baseload generation they will be able to provide flexible, clean, and reliable capacity to meet the needs of the current and future DESC system. The benefits of solar and storage are that they are highly modular and can be right sized for the specific needs of the system. In the event that future load growth is higher or lower than expected, solar, storage, and demand response resources can be easily right sized to avoid an overbuild and stranded assets like we see today.



1 **Q: In Mr. Neely’s rebuttal testimony, he states that your “alternative resource plan**  
2 **models are simply unworkable,” and would yield “an unreliable electric system,**  
3 **particularly during times of extreme cold and peak winter demand.” Do you agree?**

4 A: There are two problems with the comments made by Mr. Neely in his rebuttal testimony.  
5 The first is that Mr. Neely and DESC did not request any additional information,  
6 assumptions, or modeling results beyond the information provided in my direct  
7 testimony. As a result, he does not have the information required to make this statement  
8 and is instead relying on preconceived notions about how reliability should be managed.  
9 In doing so, he is highlighting an incorrect bias that only fossil generation can meet  
10 reliability needs.

11 For example, Mr. Neely claimed that my direct testimony stated that capacity shortfalls  
12 could be met through “existing gas resources, and limited imports.” And that there are  
13 “no existing gas resources that are not already accounted for on the system.” However,  
14 my testimony did not state that the existing gas fleet could be used for additional  
15 *capacity*, but rather replace some of the *energy* from the retired coal generation. There are  
16 underutilized gas plants on DESC’s system which can increase capacity factor to serve  
17 some of the generation from the retired coal plants.

18 The Sierra Club portfolios meet the same reliability criteria modeled by DESC. For  
19 example, the battery storage additions ensure that the system meets the 14% base winter  
20 reserve margin, and short-term capacity purchases were assumed to meet the 21% winter  
21 peak reserve margin in a similar fashion as the DESC analysis.

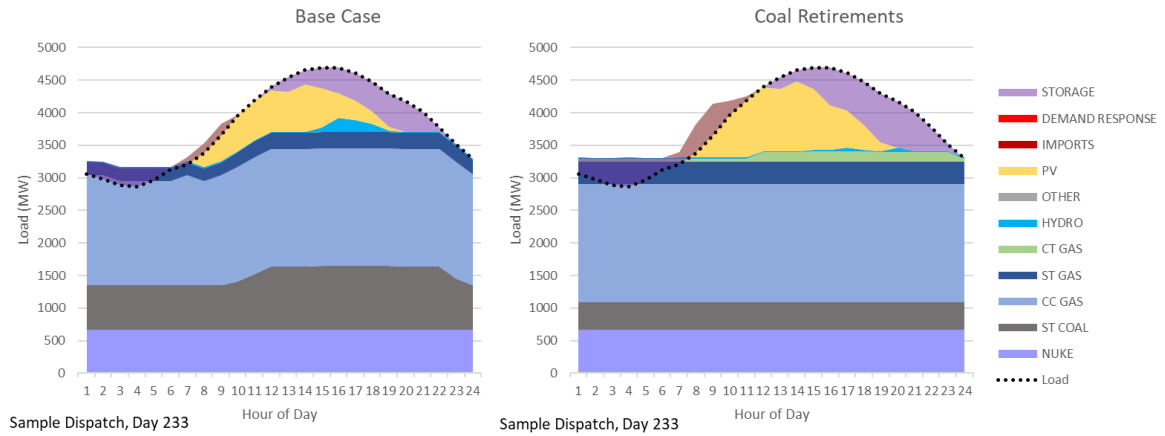
22 In addition, I made the conservative assumption in my analysis that the battery storage  
23 systems did not receive investment tax credits, which could limit their use to charge

1 predominately from solar for the first five years of operation. This increases the battery  
2 flexibility, with minimal increase to financing costs, allows them to charge during  
3 overnight hours in anticipation of the winter morning peak load, regardless of the solar  
4 resource.

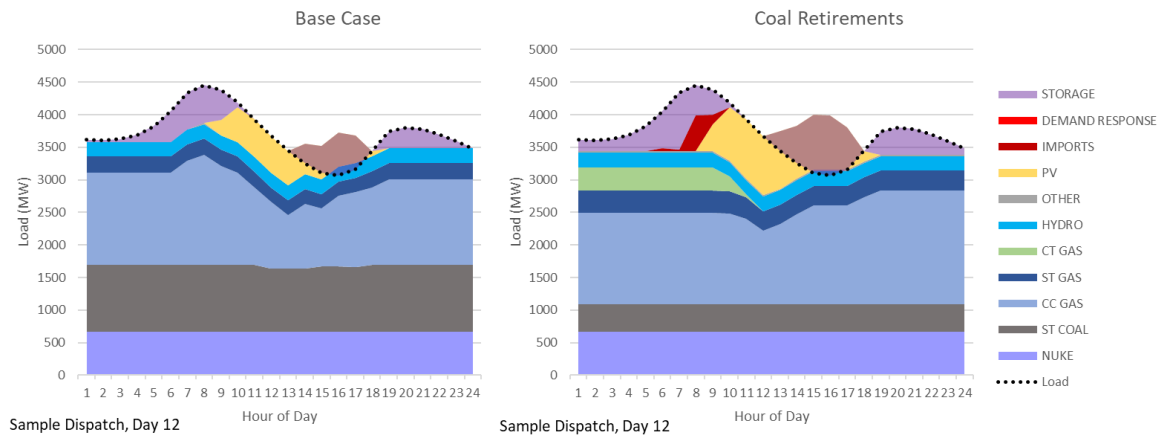
5 Maximum imports were limited to historical operations. In the modeling results from  
6 2026-2034 they are only utilized for an average of 213 hours per year (2.4% of the year)  
7 and constitute only 0.22% of total DESC load. This is a reasonable increase from the  
8 modeled system with coal plants included, which averaged 58 hours of imports per year.  
9 In addition, imports were assumed to be utilized before demand response, which were  
10 called on an average of only six hours per year. In the event that imports were  
11 unavailable, additional demand response could be utilized.

12 Figures 4-6 below, illustrate a few sample daily dispatches to show system operations  
13 with and without coal retirements. Figures 4-6 indicate that the system is highly  
14 operable, and actually requires less ramping, load following, and cycling from the aging  
15 fossil fleet. Imports, as discussed earlier, are only called on sparingly, are accounted for  
16 with short-term capacity contracts, and could be augmented with demand response if  
17 necessary.

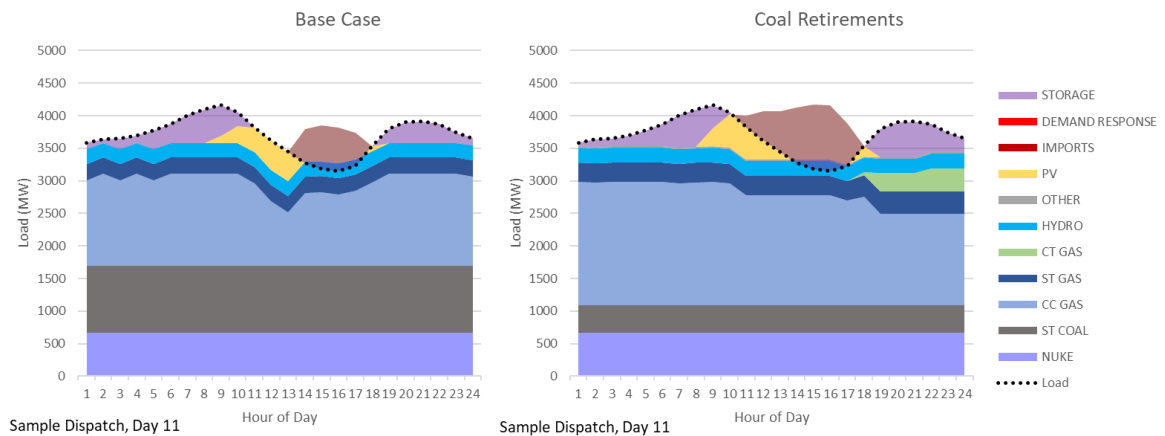
**Figure 4: DESC System Dispatch, Summer Peak Day**



**Figure 5: DESC System Dispatch, Winter Peak Day**



**Figure 6: DESC System Dispatch, Average Winter Day**



1 **Q: In Mr. Neely's rebuttal testimony, he discusses that capital cost for large frame and**  
2 **aero-derivative ICTs should not be blended into a single capital cost assumption.**

3 **How do you reply?**

4 A: I agree with Mr. Neely's assertion that capital cost for large frame and aero-derivative  
5 ICTs should not be blended into a single capital cost assumption. I understand the  
6 technical differences between these technologies. The intent of my direct testimony was  
7 to state that the DESC capital cost assumptions for the aeroderivative technologies  
8 seemed reasonable, while the ICT frame technologies were low relative to industry  
9 estimates. My direct testimony did not intend to recommend a blended capital cost, but I  
10 appreciate DESC's clarification if my discussion was unclear.

11 **Q: In Dr. Lynch's rebuttal testimony, he states that "the Company believes the COVID**  
12 **impact on sales will largely end before the end of the year." Do you agree?**

13 A: I appreciate Dr. Lynch's rebuttal regarding the impact of the COVID pandemic on  
14 DESC's sales and the data he provided which clearly shows the system load rebounding  
15 as South Carolina quarantine restrictions were lifted. However, I would like to clarify my  
16 direct testimony regarding the impact of the COVID pandemic on the DESC load  
17 forecast. In my testimony I was not referring to the load impacts of quarantine restrictions  
18 since those are relatively short-lived and not relevant for long-term forecasting in the  
19 2020 IRP. Instead I was referring to the likely reduced economic growth that could go on  
20 for years following the pandemic.

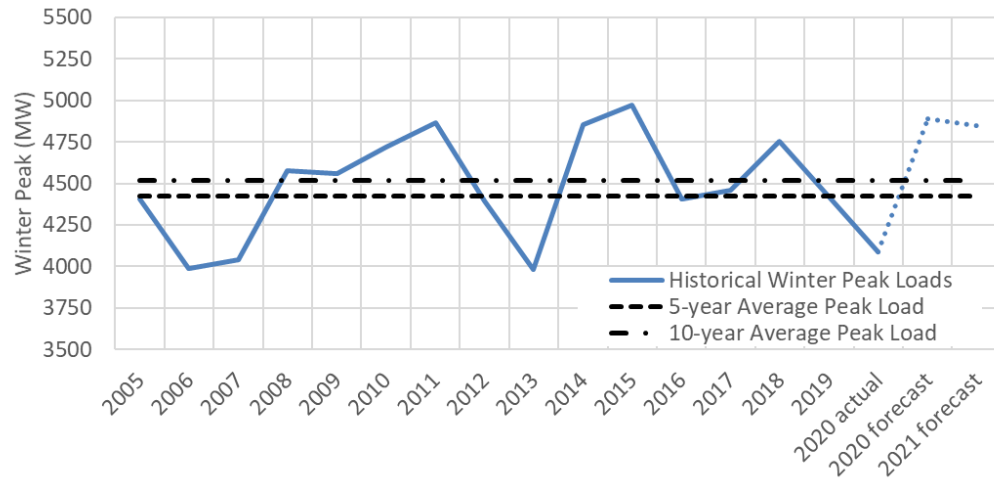
1 The United States GDP shrank by a record 32% in 2Q2020, and GDP is expected to be  
2 below pre-pandemic levels for the foreseeable future.<sup>12</sup> Even if a significant economic  
3 recession does not occur, it would be hard to envision a scenario where economic growth  
4 was at the same level as pre-pandemic levels. Because DESC's econometric load  
5 forecasts are based, in part, on economic growth, it is likely that the pre-pandemic load  
6 forecast is now optimistic.

7 **Q: In Dr. Lynch's rebuttal testimony, he claims that DESC's winter peak load forecast**  
8 **falls within the range of historical system experience. How do you reply?**

9 A: Dr. Lynch is correct that the DESC winter peak load forecast technically falls within the  
10 range of historical system experience, however it is on the conservative high-end of all  
11 recent observations. The 2020 estimated peak load of 4891 MW is 10.5% higher than the  
12 5-year average from 2016 to 2020 and 8.2% higher than the 10-year average from 2011-  
13 2020. As Figure 7 indicates, while the forecasted peaks are similar to the winter peak  
14 loads in 2011, 2014 and 2015, these are the highest observed peaks since 1991, which  
15 should be treated as outliers covered by the winter peak reserve margin.

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<sup>12</sup> United States Bureau of Economic Analysis, *Gross Domestic Product, 2<sup>nd</sup> Quarter 2020*,  
<https://www.bea.gov/data/gdp/gross-domestic-product>

**Figure 7: Historical and Forecast DESC Winter Peak 2005-2021**

While DESC may wish to be conservative in their load forecast to ensure reliability, this reliability consideration is already captured in the 21% winter peak reserve margin. The reserve margin is intended, in part, to cover higher than normal load variability. The load forecast on the other hand should utilize a normal, “50/50,” load forecast. Using a conservatively high winter peak load in the forecast *and* requiring higher winter peak reserve margins double counts the risk of winter peaks and is overly conservative and leads to overbuilding of capacity.

**Q: In Mr. Bell’s rebuttal testimony, he states that “DESC plans to conduct detailed retirement studies for potential retirement candidates in the coming years.” Do you have any recommendations pertaining to this comment?**

**A:** I appreciate Mr. Bell’s acknowledgement that retirement studies are necessary and will be conducted by DESC. However, the timeline proposed “in the coming years” is inadequate. DESC should start this analysis and process as soon as possible.

1 These studies, as Mr. Bell indicates in his testimony, should be comprehensive and  
2 incorporate both technical engineering and economic analysis. These comprehensive  
3 studies, as Mr. Bell states, will take time to conduct thoroughly, especially if they are to  
4 include valuable stakeholder involvement as DESC indicated willingness to include in  
5 future IRPs.

6 As a result, the time window to conduct these studies appropriately is closing fast. Even  
7 if the ELG upgrades are not required until 2028, the construction process will take  
8 considerable time, and the decisions must be made well in advance of the 2028  
9 compliance date. In addition, there is no guarantee the 2028 compliance date will not  
10 change due to updated environmental regulations and potential political changes.

11 An accelerated compliance schedule, if not appropriately planned for by DESC, could put  
12 DESC ratepayers at risk of paying higher costs with fewer alternative compliance  
13 options. Delayed retirement analysis could also lead to an unnecessarily abrupt transition  
14 away from coal generation, unnecessarily affecting plant employees and local  
15 communities that rely on taxes paid by coal generation.

16 Therefore, I recommend DESC start the retirement analysis of Wateree and Williams as  
17 soon as possible to ensure that the results are fully included for the next full IRP cycle in  
18 2023.

### 19 **RECOMMENDATIONS FOR THE COMMISSION**

20 **Q: After reviewing DESC's rebuttal testimony, the 2020 IRP Supplement, and**  
21 **updating your modeling work, do you have any recommendations for the**  
22 **Commission?**

1 A: In my direct testimony, I made five recommendations to the Commission: to require  
2 DESC to reanalyze the IRP portfolios, to require DESC to consider alternative portfolios  
3 that retire Williams and Wateree with clear energy technologies, to assume lower load  
4 growth projections, and to open dockets related to resource adequacy analysis and coal  
5 retirements. These recommendations are all still relevant.

6 In addition, after reviewing DESC's rebuttal testimony, the 2020 IRP Supplement, and  
7 updating my modeling work, I also make the following recommendations:

- 8 • The Commission should require DESC to correct the implementation of the  
9 battery and solar capital cost escalation rates, remove the ICT volume discount  
10 from their analysis, and evaluate portfolios with a lower peak load forecast.
- 11 • The Commission should require DESC to model the portfolios proposed by Sierra  
12 Club to include a lower load forecast, the retirement of Williams and Wateree,  
13 and the replacement with solar and storage resources.
- 14 • The Commission should require DESC to commit to a retirement analysis,  
15 commencing as soon as possible and completed prior to the next full IRP cycle in  
16 2023.

17 **Q: Does this conclude your testimony?**

18 A: Yes.